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Journal of the Society of Arts.

FRIDAY, OCTOBER 5, 1866.

Announcements by the Council.

EXAMINATIONS, 1867.

The Programme of Examinations for 1867 is now published, and may be had *gratis* on application to the Secretary of the Society of Arts.

In addition to the prizes offered by the Society of Arts, the Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, *being employed in the coach-making trade*, obtain the highest number of marks, with a certificate, in those subjects respectively.

CANTOR LECTURES.

The Second Lecture of Dr. Grace Calvert's Course will appear next week.

Proceedings of Institutions.

SALFORD WORKING MEN'S COLLEGE.—The members and friends of this college were pleasantly and instructively entertained on the occasion of the re-opening of the classes by a series of addresses upon the principal subjects taught in them; and these evening meetings have been well attended, and have given much satisfaction to both listeners and speakers. The most important consideration in having the first week of the college session given up to these meetings, was that the public, and especially the young men and women who might be induced to join the college, should have a fair opportunity of knowing what they might expect to do as pupils in the classes, and what course the teachers would take in going through the thirty or more lessons which have to be given before the examinations. The address on Monday evening (24th Sept.) was by Mr. Plant, upon the study of the natural sciences, and geology in particular, during which the value of a knowledge of the commonest animals and insects was illustrated, by an allusion to those which almost universally are found to associate with, and sometimes afflict the human family; and the pleasures of natural history study were described, as found on the sea-shore, the lakes and mountains, to which thousands of working people make their annual holiday. The main topics of geology only were spoken about, such as the beginning of life and its remarkable features; the first-created zoophyte; shell and plant; the growth of the earth; pre-historic man; and the materials found in the stones of the streets of Salford. The walls of the lecture hall were covered with diagrams and drawings illustrating these subjects. On the following evening the subjects of the addresses were—Elocution; the Modern Languages (treated upon by M. Moriau); and Geography. M. Moriau spoke of the necessity to an Englishman of a knowledge of a language spoken upon the continent, either German or French, and in what manner the usefulness of French to young men in commercial situations would be proved. M. Moriau announced that he would open a class for young women, if twelve could be found willing to join, upon terms similar to those of his young men's class. In the

absence of Professor Greenbank, who was unavoidably engaged elsewhere, Mr. Plant made some remarks upon the study or practice of elocution, and mentioned the great popularity of the classes under Professor Greenbank, which the college had hitherto possessed, these classes being always more largely attended than others, although no prizes were obtainable for the best oration from the lips of the most perfectly trained pupil. Although not himself at all inclined to look upon this art of elocution as the most beneficial study for a working man, considering the few hours he has for learning any knowledge of things and life, it was, no doubt, valuable in the way it was taught by their college professor, and his class ought to be as successful this session as ever it had been previously. Some remarks were made by Mr. Traice upon these points, and upon the great importance of learning Latin. The course to be observed for the geography class was announced; and M. Moriau read extracts from Racine and Corneille, to show the power of the French tongue in its deepest tragic form.

MINERAL PRODUCTIONS OF THE UNITED KINGDOM.

The Mineral Statistics for 1865 have been completed by Mr. Robert Hunt, of the Museum of Practical Geology. Sir Roderick Murchison, as director-general of this establishment and the Geological Survey, in his introductory notice, draws attention to the remarkable increase in the production of coal during the past year, and to some tables which, he states, "give a more correct view of the progress of our coal and iron industries than any statement which has hitherto been published." The importance which attaches to everything connected with coal at the present time fairly claims for it priority of notice, although the coal returns form Part 2 of the "Mineral Statistics."—

	Tons produced.
Durham and Northumberland . . .	25,032,694
Cumberland	1,431,047
Yorkshire	9,355,100
Derbyshire	4,595,750
Nottinghamshire	1,095,500
Leicestershire	965,500
Warwickshire	859,000
Staffordshire and Worcestershire . .	12,200,989
Lancashire	11,962,000
Cheshire	850,000
Shropshire	1,135,000
Gloucestershire and Somersetshire	1,875,000
Monmouthshire	4,125,000
South Wales	7,911,507
North Wales	1,983,000
Scotland	12,650,000
Ireland	123,000

Total produce of the United Kingdom 98,150,587

This gives an increase of 5,362,709 tons of coal in 1865 over our production in the previous year. From the tables it appears that in the last five years the quantities exported and retained for home consumption have been as follows:—

	Exported.	Retained.	Used for each head of the population.
	tons	tons	tons cwt. qrs. lbs.
1861	7,855,115	77,657,029	3 7 2 6
1862	8,301,852	75,202,936	3 4 1 2
1863	8,275,212	79,890,283	3 8 1 20
1864	8,509,908	83,852,965	3 1 0 21
1865	9,170,477	88,980,110	3 13 2 24

It is therefore evident that the largely increased quantity of coal produced is consumed in our own manufactures, in our commerce, or for domestic fires. Mr.

Robert Hunt shows, by another tabular statement, that for the same five years there have been used for every branch of our iron manufacture the following quantities:—

	Coal consumed in making iron.	Leaving for all other purposes.	Or for each head of the population.		
	tons	tons	tons	cwts.	grs. lbs.
1861	22,273,762	55,383,267	2	7	3 3
1862	23,552,107	51,650,879	2	3	0 13
1863	27,013,082	52,877,171	2	5	2 23
1864	28,715,439	55,137,526	2	6	0 3
1865	28,783,052	59,197,058	2	9	0 8

For the purpose of rendering this history of the coal trade as complete as possible within the limits to which at present the inquiry could be extended, returns of all the coal brought into London since 1834 are given, a detailed statement of all the collieries sending coal to the metropolitan district since 1854 and the prices of Newcastle and Sunderland coal in the London market during each month since the year 1832. From these it appears that in 1834 by sea and canal London received 2,080,547 tons, and in 1844, 2,563,166 tons. In 1845 the railways began to bring coal to London, the quantity in that year being 3,461,199 tons. In 1854 there was an advance to 4,378,732 tons, and in 1864 to 5,476,426. The quantity brought within the metropolitan district last year was 5,909,940 tons.

Iron.—Of iron ore we appear to have raised from our iron mines and collieries 9,910,045 tons, which is valued at the place of production at £3,324,804 13s. 2d. This was used to feed 656 blast furnaces, from which flowed forth 4,819,254 tons of pig iron. Of this we exported 543,018, and upon the remainder 6,407 puddling furnaces, and 730 rolling mills were employed in converting it into finished iron.

Tin.—The quantity of tin produced in 1865 was larger than that obtained from our tin mines in Cornwall and Devonshire in any previous year, amounting to 15,686 tons of tin ore, of the value of £867,435, from which 10,039 tons of metallic tin was obtained. The quantities of tin ore produced during the previous five years have been as follows:—

	Ore raised.	Price per ton of ore.		
	tons	£	s.	d.
1860	10,462	71	11	0
1861	11,640	62	7	0
1862	14,127	59	14	0
1863	15,157	63	12	0
1864	15,211	60	17	0

The increase of production has strangely kept pace with a steady decline in price, until in 1865 the mean average price was £55 6s. The system under which our tin mines have long been worked renders it necessary to meet the exigencies of the share market, that at any cost calls may be avoided and dividends declared. Hence, as the price has fallen each mine has poured more tin into the market to put off for a short season the evil day which must soon arrive. Seeing that very large quantities of tin are steadily arriving in this country from Banea and Billiton, and that the Dutch merchants hold 7,690 tons of tin, available for the coming twelve months, there is no hope of any increase of price, until necessity, by closing many of our most productive tin-mines, reduces the supply.

Copper.—The copper mines of Great Britain and Ireland produced last year 198,298 tons of copper ore, of the value of £927,938. From this 11,888 tons of copper were smelted, which had a value of £1,134,664. The production of British copper ores has been for some time steadily declining—the ores, as shown by a table given, are becoming poorer, and the price, which was for Cornish copper ores in 1856, £6 2s. 6d., fell to £4 15s.

in 1865. The imports of foreign and colonial copper have been very large, that of copper ore amounting to 82,562 tons, while cake and manufactured copper have also been largely imported.

Lead.—The total quantity of lead ore raised in the United Kingdom in 1865 was 90,452 tons, from which we obtained 67,181 tons of metallic lead, and 723,856 oz. of silver.

Zinc.—The ores of this metal—blende and calamine—have been raised more freely, owing to a slight advance in the price of the ore, than it has been for some years past. Our mines produced last year 17,842 tons of zinc ores, against 15,047 tons obtained in 1864.

Gold.—From the gold quartz which is mined from the Welsh hills in the neighbourhood of Dolgelly we have the following returns:—

	Ounces of gold.
Vigra and Clogau	532
Welsh Gold Mine	277
Castell Carn Dochan	837
Gwynfynydd	9
Cwmheisian	8
	1,663

In 1864, 2,336 ounces of gold were obtained, and in 1862, 5,299 ounces.

Sulphur Ores.—Iron pyrites has been raised during the year to the extent of 114,115 tons, the value of which is estimated at £71,174. Of this quantity 81,993 tons have been raised in county Wicklow, Ireland.

Barytes.—A mineral which is largely used to mix with white lead; there are returns given of 6,768 tons.

Arsenic.—Of the white oxide of arsenic a return has been made to the Stannary Court of 826 tons, separated from other ores, and sold in Cornwall.

The following table gives a concise view of the importance of our mineral industries:—

GENERAL SUMMARY OF THE MINERALS RAISED AND METALS PRODUCED IN THE UNITED KINGDOM IN 1865.

	Quantity of Minerals raised.	Value of Minerals raised.	Quantity of Metals produced.	Value of Metals produced.
Tin	15,686	£867,435	10,039	£971,273
Copper	198,298	927,938	11,888	1,134,664
Lead	90,451	1,153,134	67,181	1,433,161
Silver	—	—	724,856	199,335
Zinc	17,842	52,478	4,469	104,810
Pyrites	114,195	71,174	—	—
Gold (quartz) ...	4,280	—	oz. 1,164	5,824
Iron	9,910,045	3,324,804	4,819,254	11,774,220
Coal	98,150,587	24,537,621	—	—
Earthy minerals and others, returned	—	774,466	—	—
Earthy minerals, not returned, estimated	—	650,000	—	—
Metalliferous ores & metals, other than above, estimated	—	—	—	150,000
Total value	—	£32,359,080	—	£15,773,287

The following, therefore, represents the total value of the productions of our mines and collieries in 1865:—

Metals obtained	£15,773,287
Coal	24,537,621
Earthy minerals (not including ordinary clays and building stones)	1,434,496
Total	41,745,404

The Mineral Statistics give, as the latest and best account of the coal produced on the continent of Europe and in America, the following returns:—

	Tons.
France, 1865	11,300,000
Belgium, 1862	9,758,223
Prussia, 1863	10,074,815
Prussia, 1863 (brown coal)	4,003,044
Saxony, 1863	1,902,175
Saxony, 1863 (brown coal)	428,615
Grand Duchy of Baden, 1864	12,338
Hanover, 1863	287,415
Hesse and Nassau, 1864	79,296
Electoral Hesse, 1865	308,150
Electoral Hesse, 1865 (brown coal) ..	170,600
Bavaria, 1862 (coal)	221,220
Bavaria, 1862 (lignite)	45,570
Zollverein, 1863 (coal)	16,906,707
Zollverein, 1863 (lignite)	5,459,494
Austria, 1862 (coal)	2,265,228
Austria, 1862 (lignite)	1,786,679
Russia, 1863	6,350,000
Denmark, 1864	2,775
Sweden, annually	30,000
Holland, annually (inferior)	18,000
Portugal, annually	14,500
Switzerland, annually	15,100
United States of America, 1864 ..	14,593,659

BRITISH ASSOCIATION, 1866.

ON A NEW PROCESS IN THE MANUFACTURE OF WHITE LEAD. BY PETER SPENCE, ESQ.

The following paper was read in the Chemical Section:—

White lead is one of the staple chemical products of almost first necessity. It has long been in use as the basis of nearly all the pigments employed in oil painting, few, if any, of the colouring bodies having the qualities that are required for painting in oil; and although, from its susceptibility to discoloration on the slightest contact with sulphuretted hydrogen, and also from its poisonous character, substitutes for it have been eagerly sought after, as yet nothing has been found to supersede it. Anhydrous oxide of zinc has to a certain extent been introduced, but does not appear to make any way. It has not an equal covering quality with carbonate of lead; but its chief defect is its want of permanency. White lead forms an almost indestructible compound with the oil, while oxide of zinc forms only a mixture. The various modes that have more or less been adopted in the manufacture of white lead are historically known to those interested in chemical manufactures. Almost all of these processes are based on the action of acetic acid upon lead or lead oxide, with the exception of the process patented by Pattinson in 1841, which is founded on the decomposition of galena by hydrochloric acid, the formation of chloride of lead, and the decomposition of the chloride by alkalis or by alkaline earths, such as lime or magnesia. Practically, this process is now confined to the production of oxychloride of lead, which seems to act with oil to a great extent like white lead. The oldest, most successful, and most generally practised mode of producing white lead, is that called the Dutch process; by this mode the object is accomplished by placing castings of pure lead of a suitable form one over another in stoneware pots, in the bottoms of which acetic acid or vinegar is poured; the pots are then loosely covered and piled in masses, the whole being then covered over with spent tan or some other slowly fermenting body, which will generate a small degree of heat for a considerable period. This evaporates the acetic acid, which acts on the lead, oxidising it and partially carbonating the oxide, and in about eight weeks the greater part of the lead is corroded and converted into oxide and carbonate of lead, the acetic acid is spent, and the crude lumps of white lead are ground, any metallic lead left being picked out, and after washing, the article is ready for use. Nearly all the white lead now made in this country is by this mode. The German and Austrian process is

the same in principle as the Dutch, but differs in detail. A good many attempts at the manufacture of white lead have been founded on the fact that acetate of lead in solution has the property of dissolving lead oxide, forming a basic compound.

My reasons for presenting to the Chemical Section of the British Association a process which may at first sight appear only as one of the many futile attempts to improve upon the established mode of producing white lead are two:—First, that the process is new, being in altogether a different direction from any attempt that I can find recorded, and although based upon a known law, yet that law never having been seen to point to this process, it is technologically a discovery. My second reason is, that a very important feature of the process as distinguished from all others is, that by it white lead can be manufactured from materials now useless. All other modes deal either with the purest metallic lead or equally pure oxide of lead. Pattinson's process must deal either with the purest galena, free from iron or copper, or the chloride of lead must subsequently be freed from contamination by these metals or others, before it is used for the precipitating of oxychloride. By the process I shall now describe, any ore or mineral that contains eight or ten ounces of lead can be used for the production of white lead, and it is of no consequence what other metal the mineral contains; the process separates the lead directly without touching the other constituents of the mineral, and the white lead is perfectly pure. This being so, practically, I expect that all the white lead required may be made from ores or minerals now consigned to the rubbish heap as being too poor to work; and I know of large quantities of minerals useless as lead ores which will be economically adapted for the production of white lead. The process is based on the fact that oxide and carbonate of lead are soluble in solutions of caustic soda or potash, and are insoluble in the carbonates of these alkalis; the process, therefore, is effected by taking any mineral that contains oxide or carbonate of lead, or lead in any form that can be calcination or otherwise be converted into oxide or carbonate of lead, and by either macerating or boiling the mineral in a caustic solution all the lead is dissolved and extracted in a limpid and colourless solution. If the mineral contains oxide of iron, copper, or zinc, the caustic solution does not touch any of these oxides, and only attacks the lead. The lead solution has now passed into it carbonic acid gas, by which the alkali being carbonated, the lead is instantly precipitated as oxide and carbonate. The alkaline solution is now causticised by quick lime, and is ready for a second action on mineral containing lead oxide. The precipitated white lead has only to be washed to separate the solution of carbonated alkali, and then dried for use. A sample of it is on the table. It has been tried for painting, and is said by the painter, who had it used in various ways by his workmen, to be equal to any white lead he could procure. It has also been tried as a glaze in the potteries, and declared to be equal to any white lead the firm had in stock. As the process, at least in the laboratory, is a rapid one, if it would at all gratify the Section, I have the materials at hand, and can show it all in half-an-hour. The substance from which I shall now extract pure white lead had the following composition before calcination. I have brought the materials already calcined, as the calcination could not have been done here. Analysis:—Zinc, 30·656; sulphur, 26·483; silica, 19·154; lead, 13·148; iron, 9·121; copper, 1·027; alumina, 0·216; silver, 0·022; moisture, 0·122; total, 99·949.

Mr. Spence then demonstrated by experiment the manufacture of white lead upon the principle given in the paper.

THE SORGHUM SYRUP CROP.

The following is from the *American Agriculturist*:—
We know of no other crop ever having been intro-

duced among agriculturists which grew so rapidly in popularity as has the sorghum. Many circumstances have conspired to render the product more valuable than could have been expected when it was first introduced; and now, after ten years' experience, we have seen it grow constantly in favour, and its culture so extend, that in many districts, in widely different parts of the country, it is regarded as one of the staple crops, ranking with corn, potatoes, wheat, &c., in importance. The profits per acre, at the present price of sugar, are larger than those yielded by any of the staple crops, except perhaps tobacco and hops. We have never known any one who began to raise it, and who possessed a mill and evaporator, or could easily get his cane to them, who gave it up.

The syrup—gained by simply boiling the expressed juice, skimming of the feculent matters which rise as scum to the top—is often of very good quality; and under other circumstances of soil, manuring, maturity of the cane, &c., it is very poor, acid, and coloured; still the poorest qualities may be purified and refined, so that it all has a market value, especially in those parts of the country where it has been most grown. The improved evaporating-pans, of which several claim the favour of the public, enable a common hand, with a modicum of judgment, to produce clear well-flavoured syrups in most cases, which sells as high as or higher than good West India molasses, and answer all the purposes for which that is used in our kitchen economy. The prospects now are, if the weather continues favourable, that the yield of syrup this year will be vastly greater than ever before.

Within a year or two the discovery has been announced, and to a good degree confirmed, that the earlier the cane is cut the more sugar is obtained in a crystallizable form. We have always held that the quantity and quality of the sugar separated from sorghum syrup was such that it was much better not to aim at its production, but rather to produce syrup. What we have seen, with the exception of a few samples, was gummy, lacking in sweetness, and not as thoroughly crystallised as good sugar should be. However, if it be a fact that cane cut and worked early will yield a paying percentage of good sugar, it may greatly alter both the product and the profits. It must be remembered that green cane abounds in feculent matters.

In harvesting the Sorghum, it is primarily necessary to cut it before hard frosts, and to have it housed or protected from them. It is immaterial, probably, whether the topping and stripping be done at once, or later; and practice differs. The stripping is conveniently done by the hands, which must be protected with leathern mittens, or, what is better, square pieces of kip skin, to cover the palms, in which a fold may be sewed for the thumb to go in; and if necessary a strap may be sewed upon the back to go over the two middle fingers. As the cane stands, it is stripped from top to bottom at one motion, the leaves being laid between the rows. After this is done upon as much ground as it will take several hours to cut, the stalks are cut at the ground, and laid between the rows in gavels, resting upon the leaves to keep them out of the dirt. The tops, with about three feet of stalk, are cut at the same time, so that the gavels of cane may be bound at once. The bundles should be of a size convenient to handle, and bound with two bands, which may be made of the leaves, if not too dry. The tops are also bound in sheaves, to be cured and fed out in the bundle or threshed. The leaves make very good dry fodder, being considered superior to corn fodder, of which, however, we have some doubt, for we value corn fodder very highly. These operations are laborious and tedious, so much so that at the west, where the relative value of labour is high, some farmers do not strip, but pass both stalks and leaves through the mill, even at a loss of considerable juice in the more bulky bagasse. The cane is best when the bundles are at once removed to the shelter of a roof of some kind; but when this is not practicable it should be piled up like cord wood, and covered by a course of boards laid edge to edge and

battered, or laid to break joints, thus == == ==, or in some other way, protected from the weather and from freezing. It may be worked any time before hard freezing weather.

The time to cut the cane is said to be when the seed begins to turn brown, that is, when it is in the milk. At this time certain changes are going on in the stalk, which are not perfectly well understood; this much, however, is certain, that some cane sugar exists there, together with a considerable portion of the grape sugar, that the former is converted into the latter in the process of ripening, and that, as the ripening progresses, a considerable portion of the grape sugar is converted into starch and woody fibre. It is probable also, that at an early stage much fruit sugar exists in the Sorghum. This differs from grape sugar in being much sweeter, and never assuming the crystalline form. Cane sugar crystallizes very readily, as we all know, for this is the common sugar, brown and white, which we use, derived from the southern cane, from the maple, from the beet, &c. Grape sugar is much less sweet, five parts sweetening as well as two parts of cane sugar, or of fruit sugar, which is as sweet as cane sugar. Honey contains both grape and fruit sugar. That portion which solidifies when honey becomes candied, is grape sugar. When grape sugar crystallizes, it usually forms needle-like crystals, grouped in such close masses that no crystals can be seen. It attracts moisture from the air, and becomes a pasty mass. Most of the Sorghum Sugar we have examined is a mixture of cane sugar crystals, which are very distinctly seen, together with the gummy mass of grape sugar, and more or less molasses. When cane sugar is subjected to the action of a ferment, or any acid, it changes rapidly into an uncrystallizable sugar, which in its acid and more or less impure state we know as molasses, and which is very similar to, if not identical with, fruit sugar. The juice of the Sorghum contains more or less acid, a green substance which is a very active ferment in its natural state, and which, on being changed by boiling, if any be left in the syrup, gives it a disagreeable flavour.

It is important that the canes be bundled and kept so that they will not be bruised, whereby air would come in contact with the juice, and corrupt it. They should be thoroughly ground, as it is called, that is, passed between rollers, so as to express all the juice possible at one operation. The juice should be exposed in the least possible degree to the air, and, if delay be unavoidable, a very small quantity (one or two pints to one hundred gallons) of bi-sulphate of lime should be added, the operation of which is to arrest any incipient fermentation. The juice should be boiled down in flat pans as rapidly as is consistent with thorough skimming. If it is very acid, milk of lime is added, seldom more than a pint to thirty gallons. Towards the latter part of the operation, the syrup should not boil, for the albuminous gummy substance will rise like cream upon the still surface, and may be removed. If the boiling continue rapid it will not rise, but remain floating in minute particles through the syrup. The syrup is evaporated until it has, on cooling, the thickness of molasses.

There are several evaporators of well established reputation, with which, as we have said, any one of common sense can make good syrup, and if the juice contains cane sugar, this may also be obtained. To this end the syrup is evaporated considerably more than the consistency named, namely, to thirty-eight or forty degrees of Beaumes' Saccharometer, while twenty-five to thirty degrees is a sufficient density for syrup. On cooling and stirring, the sugar forms, and may be separated in a crude state by draining off the molasses.

M'INDOE'S TRANSPLANTING MACHINE FOR LIGHT WEIGHTS.

The following is a description of this machine, for which a prize of £5, given by the Society of Arts, was

awarded at the International Horticultural Exhibition to the inventor, Mr. M'Indoe, gardener to Mr. Coles Child, of Bromley Palace, Knet* :—

This implement is capable of transplanting trees or shrubs of from five hundred weight up to nearly two tons. The machine can be passed through a four-foot gate, over narrow walks, grass lawn, &c., without doing any injury. It has two wheels or rollers, three feet in diameter and thirteen inches across. Between these, fixed on the same axis, is a narrow cog-wheel, two feet eight inches in diameter, and over it a ratchet wheel, nine inches in diameter, the turning of which with the handles enables the operators to move the machine backwards and forwards without difficulty. The pole over the wheels is supported by strong iron bands (one by three inches), and when level is five feet six inches high, 17 feet long, and, with the addition of the auxiliary pole, can be extended to 22 feet. Along the sides, where the greatest strength is required in leverage, iron bands (two inches by $\frac{3}{8}$ of an inch) are inlaid in the wood. There are prongs extending from the end of the pole, two feet six inches long and the same dimensions across the points. They are covered with canvas stuffed with moss, to prevent the sharp edges rubbing the bark of the branches of shrubs. From these prongs are suspended two belts, made of strong tarred cord, about the thickness of sash-line; they are six feet long and one foot across, with three feet of chain to each end. At the opposite end of the pole are two small wheels, 18 inches in diameter, and there are hooks under the pole, for hanging half-hundred-weights, which, with two more hung on the axis of the small wheels, are found of great use when the machine is loaded.

When a tree or shrub is to be transplanted the operators commence in the usual way by digging out a trench, at a safe distance from the stem, and, with a pick and fork, work towards the place, taking all possible care of the small roots, and pegging them up as the work proceeds, till the plant stands on a pivot of about a foot in diameter. Then the belts should be placed cross-ways round the ball, and the machine should be backed (if on two planks all the better). The small wheels should then be taken off, and a rope put round the end of the pole, which should be raised till the chains can be hooked on to the prongs. The pole must now be pulled back again, and if a block and tackle be at hand they will be found of great service in this operation. When the pole is got down again put on the small wheels and weights; and with two men at the end of the pole and four at the handles, a tree a ton in weight may be moved anywhere if the ground is tolerably hard and level.

In this way the inventor has within the last two years superintended the transplanting of upwards of 100 trees and shrubs, including evergreen oaks, and conifers, (from 10 to 30 feet high), yews, hollies, Portugal laurels, the lauristinus, the arbor vitæ, the juniper, &c., from six to ten feet high. With the exception of two large trees, which were transplanted under very unfavourable circumstances, every one of these is said to have turned out a success.

DRYING OF GRAIN.

The continued wet weather during the late harvest directs attention naturally to the importance of systematic and effectual arrangements for drying and storing of corn. Hitherto there have been little or no advance in this direction in this country, and the method usually adopted has been that of the ordinary kiln, without any or with scarcely any improvement, which modern science and skill have adopted in other operations. Various plans have been at different times suggested, and many years ago Mr. Bodmer had a plan which he patented for submitting the corn to a stream of dry air, the corn being kept con-

tinually in motion, so that every grain was brought into contact with the air. There were also other plans on the same principle brought forward, but the idea never seems to have taken root in this country. It appears, according to the *Times* correspondent at Verona, that there the government have adopted a system of this character. He says, "It is a patent of a Frenchman, Devaux by name, and is most complete."

"Everyone knows how difficult it is to preserve grain for a long period from damp, worms, rats, and other 'small deer,' and a system that will effect this is worth much expense when this is compared with the value of the lives that depend on a due supply of wholesome food. The reservoirs intended to convey the corn are 130 in number, each of them being 42 feet (Austrian) in height and 7 feet square, made of iron plate pierced with small holes all over its surface. A hollow cylinder of the same metal, also pierced with holes, runs up the centre of each reservoir, and communicates at the bottom with a tube through which a blast of air can be driven by a fan when required. I was informed that each reservoir will contain 1,000 measures of 45 lbs. When a new supply of grain is to be brought in it is run into the establishment in railway trucks, and the sacks are emptied into square receptacles, consisting of large iron boxes let into the ground, and from this time forth the food is touched by no hand of man till it is taken hot out of the oven in the form of the excellent bread supplied to the soldier. To carry the corn to the top of the reservoirs an endless leather band, covered on its exterior surface with a number of buckets, is employed. The apparatus on this principle most familiar to the general reader is probably the machine used to clear the channel of a river from mud. As the hand revolves by the action of a steam engine each bucket scrapes up its share of grain and conveys it to the top of the house, dropping it into long iron troughs, which pass over the tops of all the reservoirs.

"On each trough works an Archimedian screw, which passes on the corn without ceasing to its furthest end, or drops it into any selected reservoir by the opening of a small door in the bottom of the trough. There is, of course, a door above each reservoir. When one is filled the door is shut and the next opened, and so on. If the wheat or oats are dry and clean when put in, the natural circulation of air through the centre shaft and the holes in the exterior of the iron reservoir cases is sufficient to preserve it for some time; but if more drying is needed, or it be required to guard against worms, &c., the top of the centre tube is closed, and air blown into it from underneath. The draught, having no means of exit except through the numerous small holes, is thus driven through the corn, and not only dries it but creates such a vibration as to render the life of any worms that may be in it such a burden to them that they cannot enjoy domestic ease nor bring up their young, but are driven, Tantalus like, to despair in the midst of plenty. But even this is not considered sufficient. The great weight in each reservoir might cake some of the corn at the bottom, and in any case a little circulation is good for it, so shutters are provided at the bottom of the reservoirs, near the ground, to let out the corn when necessary. Spouts under the shutters convey the grain into troughs with Archimedian screws; and these lead it, tumbling over and over, to the endless band and buckets which raise it again to the top, where it goes through the usual routine, having been well mixed on its way. Then there are steam mills for grinding, steam apparatus for mixing the dough, and small carriages to run the bread into the ovens, of which there are twelve."

A commencement, however, seems to have been made in introducing this system into England, and a company is carrying it out on a large scale. A granary has been erected at Canada Wharf, Rotherhithe (capable of holding about 50,000 qrs.), which granary is likely to be considerably increased. The invention, it is hoped, will be a great boon to the grain

* See present vol. of *Journal*, p. 577, class 231 C.

trade and the public at large. Since the granary was opened in June, 1865, its value has been tested in bringing into condition, in a very short space of time and at a very moderate expense, parcels of grain arriving after a long sea voyage in a heated condition, and by keeping in good condition the grain warehoused in the granary.

The secretary of the company writes as follows:—

"To show that this system of granary is now beginning to be appreciated as it should be, I may mention that the Lombardo-Venetian Railway Company constructed three years since a granary at Trieste capable of storing 100,000 qrs. of grain, which is now working to the entire satisfaction of the company. It is, probably, the largest granary in the world. The Austrian Government constructed for military purposes two granaries of between 30,000 and 40,000 qrs. each, one at Bruck and the other at Verona, the latter described by the *Times* correspondent. Another of 12,000 qrs. exists at Liverpool; and I may say that in all these granaries, hard labour being superseded by steam power, the cost of working is less and the work is better done, and they thus give the greatest satisfaction to their owners and the public. The directors will have pleasure in allowing any of your readers to inspect their premises on applying to me for an order for that purpose."

"A Colonist," writing to the *Times*, refers to the means adopted in Ceylon as regards the coffee crop, and says:—

"Coffee is cultivated in Ceylon at from 1,000 to 4,000 feet of elevation above the sea. The lower grown coffee is ripe some weeks before that grown on the higher ranges, and the weather and climate of the lower lands are generally more favourable to the processes which have to be adopted. These, so far as they are carried on at plantations, are to pass it through a machine which deprives it of its pulpy, juicy covering, to wash the mucilaginous matter from the beans (still covered with a parchment skin), and afterwards to dry them.

"As often happens after a few partial gatherings, a crop of many thousand bushels becomes ripe altogether, and requires to be gathered at once or the fruit will fall to the ground; much anxious care and watchfulness is required to dry all off without injury to the quality and value of this very delicate staple. On the lower estates, thanks to a powerful sun, this is generally accomplished by spreading the coffee to dry on the barbecue or mortar-laid platform, or even on mats. But on the higher plantations, where the rains fall almost continuously during the earlier monsoon months, artificial means have to be resorted to so as to dry the produce that it may be sent to the shipping port in good condition, to be finally prepared and sent to Europe. Mr. Clerihew's patent, of which a model appeared at the Exhibition of 1851, accomplishes this object perfectly, and is almost universally adopted in this island. It consists of fanners, worked by a waterwheel or any other power, to draw a stream of dry air through the floors of a building on which the wet parchment coffee is laid sometimes 18in. thick. By these simple means crops which would otherwise have rotted in the store are made to reach the port in the most excellent condition. Cannot something like this be applied to corn in wet seasons, first to the ears accurately taken off by a machine for that purpose, and then to the straw?"

The importance of the subject at the present time cannot be overrated, and the suggestion is thrown out that to each corn-milling establishment, where the business is sufficiently large to warrant it, an arrangement of a similar kind to the above should be attached in lieu of the old-fashioned kilns which some of them now possess. The proprietors would then be enabled to apply the system to and turn to account the home-grown damp wheat of their own neighbourhood, which without it could not be used.

INUNDATIONS IN FRANCE.

France is suffering from one of those accidents which at irregular intervals cause such sad destruction of property and even of human life. The long continued and heavy fall of rain, happily now replaced by delightful summer weather, has caused many of the rivers to overflow their banks, laid many thousands of acres under water, and interrupted the traffic in several parts of the country; the districts which have suffered most being the lines of the Bourbonnais, of Bordeaux, of Nantes, and of Mont Cenis. The Seine at Paris has overflowed its banks in several places, and its waters are filled with mud, vegetable matter, casks, timber, and all kinds of miscellaneous objects, and several of the floating baths have been seriously injured. The cellars and basement floors of thousands of houses are under water. The amount of water predicted for the 27th and following days of September was 6.35 mètres of the gauge of the Pont Royal, but the level has risen to nearly, if not quite, seven mètres; this is a greater depth than has been known since the year 1802, when it was 7.32 mètres; in 1807 it rose to 6.70, in 1836 to 6.40, and in 1850 to 6.05; the highest altitude recorded was in the years 1615 and 1690, when it reached 8.93 mètres. The augmentation has not exceeded 70 to 80 centimètres. At Bercy the streets have been under water, and the whole of the wine on the quay there had to be removed in the greatest haste. It is feared that several lives have been lost, but only one has been authenticated; several horses and other animals have been swept away by the flood, which, amongst other unusual things, brought a sturgeon up to the quay of the Louvre.

On the Lyons railways beyond Charenton, the rivers Seine and Marne are converted into vast lakes, which cover the meadows for miles and to a great width; factories, farms and houses stand in four or five feet of water, and the trunks of trees are nearly hidden from sight; immense quantities of grain, &c., have been lost, hundreds of stacks standing half under water, and many more fallen and being washed away by the flood. In one place the River Marne had burst through and washed away an embankment, and the earthworks of the railway were slightly injured; gangs of men were repairing the damage as we passed over the ground on Friday, the 28th of September. Detachments of military engineers have been sent to the Orleans station with pontoons, and for the relief of the surrounding country. This last town seems to have suffered very severely, the condition of the Loire being described as terrible; the trains were interrupted on the nights of the 27th and 28th, by the destruction of a portion of the line of railway between Orleans and Saint-Cyr-en-Val, and four hundred inhabitants of the rural districts found shelter from the authorities of the former town. The whole of the valley of the Nevers was under water, and it was greatly feared that the embankment there would be thrown down. At Cosne and Saint Hilaire, and many other places, the banks of the river were broken through. At Beaugancy a breach was formed in the embankment of the Valley de Cléry, just below an iron bridge constructed there after the inundations of 1856. At Tours also the dikes were destroyed and part of the town inundated. The traffic on the Bordeaux line, in the department of the Indre-et-Loire, was suspended for several hours. At Amboise the banks were washed away to the extent of a thousand feet, and the town inundated. The damage done in the valleys of the Loire and the Allier are very serious, the railways having been broken up in several places. Bridges were carried away at Misy-sur-Yonne and several other places. Even small tributary streams, such as the Lonig, which falls into the Seine, have laid many hundreds of acres under water, and utterly destroyed outlying crops.

Accounts from Savoy are still worse; in the Haute Maurienne, the imperial route which leads to Italy is

destroyed to the extent of four or five miles, by breaches in several places between Ternignon and Saint Jean de Maurienne, and it is feared that it will take two months to re-establish the road.

PRIZES IN ARCHÆOLOGY AND HISTORY OFFERED BY THE FRENCH GOVERNMENT.

The Minister of Public Instruction has just issued the list of subjects for which the learned societies of the provinces are invited to compete during the three coming years.

A prize of the value £60, or two or more making together an equal amount, is offered for the best work or works on Archæology, published in the memoirs of the learned societies of the departments or sent direct to the Minister. A prize of like amount to be awarded to the society that shall send to the minister the best glossary of the patois or rustic dialect of any district of the country. A third prize of the same amount is offered to the society that shall furnish the best memoir on the following subject:—Indications respecting the Commerce and Industry of the Middle Ages, derived from authentic documents, referring either to a province or to a town, with special reference to the following points:—The practices and rules of trades; the condition of workmen, employers, and dealers; the nature of the commodities; prices; modes of fabrication; meetings of tradesmen and fairs; the commercial relations of towns and populations amongst themselves; rates of salaries and wages; and exchange and value of money.

It should be explained that the whole of the learned societies of the provinces meet together once a year in Paris, when various questions are discussed, plans adopted or suggested for the coming year, and prizes announced, under the presidency of the Minister of Public Instruction. Such a union of provincial societies seems eminently calculated to stimulate the vigour and add to the efficiency of all; it is, in fact, a kind of French association for history, archæology, and cognate matters.

ADULT EDUCATION IN FRANCE.

This is being materially aided by the importance given to the distribution of rewards all over the country to the teachers of the adult classes; the awards consist of medals given by the Emperor, the Prince Imperial, the *Conseils-Généraux*, and private persons, of books given by the Minister of Public Instruction, and of a new decoration called the University Palms, two small palm branches in silver, relieved by a thread of violet-coloured enamel along the stems. The prices of the railway tickets, with the exception of the Orleans line, are reduced for the occasion, and the teachers flock to the meetings in large numbers. At all these meetings addresses are delivered by gentlemen representing the Government and the local authorities, and the enthusiasm is general. In the Aisne there were about five hundred teachers at the meeting, and they assembled afterwards at the Hôtel de Ville, and sent an address to the president, M. Hébert, questeur of the Corps Legislatif, ending with the following phrase:—"We all undertake to work during the coming year to surpass, if possible, our worthy rivals of the eastern part of the empire, and so as finally to triumph over ignorance, and to rejoice the heart of the father of the country!"

At Calvados, the Prefect received twenty decorated teachers at his table; two hundred teachers came from Caen alone to the meeting. In the Haute-Garonne the Comte d'Ayguévives, Chamberlain to the Emperor, and the deputies of the department were present; and an eye-witness, writing to the minister, says, "An expression of gratitude was painted on all countenances, and enthusiastic cries escaped from every breast." The department of the Ille-et-Vilaine stands lowest in the educational scale of France. The meeting at Rennes was

attended by the Archbishop and all the dignitaries of the neighbourhood; and the Inspector of the Academy expressed a confident hope that Brittany would soon be placed in this respect on a level with the other parts of France. At Châteauroux, M. Charlemagne, deputy, said, "Under a system of commercial liberty, the prosperity of nations is necessarily subordinate to the instruction of the masses; and in France we have not the time to wait for the results of education given to children, hence the importance and the urgency of adult instruction." At Tarbes the cross of the Legion of Honour was presented to M. Bordère, a teacher at Gèdre, amidst a perfect storm of applause. The scenes are said to have been similar in all parts of the country, and the accounts of the disinterested labours of the poorly-paid teachers in establishing and conducting adult classes in their schools reflect the highest honour upon that useful but humble class.

The Consul-General of Mayenne has just founded, at the proposition of the Prefect, a grand prize, consisting of a gold medal of the value of 250 francs (£10), in favour of the teachers of the adult classes in the department. There is no doubt that the rewards and recompenses thus publicly given to the teachers, the honours distributed by the Government, and, perhaps, more than all, the *Éclat* thrown over these annual meetings will have an immense effect in inciting the schoolmasters to further efforts, and will, moreover, arouse hundreds of poor men and women from the intellectual torpor into which the want of a knowledge of the elements of education has plunged them. If adult ignorance continues to be combated against by such means as these, the number of those who can neither read, write, nor cypher will be very rapidly diminished, and other countries must look to themselves if they wish not to be left behind in the race.

Fine Arts.

EXHIBITION OF THE WORKS OF THE LATE GODFREY SYKES.—In the South Kensington Museum have been, and still are, on view 212 sketches, designs, paintings, and modelled works, which determine the precise position of the artist whose early death the public have cause to deplore. Godfrey Sykes, as pupil, pupil teacher, and master in the Government School at Sheffield, is justly claimed as a successful product of our national system of art education. Twelve years ago, while yet a student at Sheffield, he executed the "design for bronze gates for a school of art," here exhibited, which gave proof both of individual talent and of early and unmistakable predilection for the schools of Michael Angelo and Raphael, to which he became devoted. Six years later he was invited to London, to design and execute the terra cotta decorations in the arcades of the Royal Horticultural Gardens. The material, though used with advantage in many Middle-age buildings, especially in the north of Italy, was comparatively untried in this country as a means of architectural enrichment. What power of adaptation and readiness of invention Sykes brought to this task the designs now placed before the public will indicate. Here are "drawings for the north arcade," "designs for capitals," "for spiral flutes," "for cap and centre of columns," which, as far as they have yet been executed and placed in position in the arcades, have obtained approval from architects and decorators, even of opposing schools. Certain sketches, which Sykes made during continental excursions, are specially interesting, as indicative of the sources whence he obtained art materials and ideas. The drawings made of the well-known brick enrichments in the Ospedale Maggiore, Milan, and of other scarcely less-famed examples of terra cotta in the cities of Lombardy, show how carefully our English student settled his practice on historic precedent. The two hundred and twelve works

exhibited show what were the talents and the acquired skill which obtained for Sykes the appointment of decorative artist to the Kensington Museum, and what was the nature of the labours which such an office imposed. Here may be studied "designs for the north and south courts of the Kensington Museum," "coloured sketch of one bay of the residences," "designs for spandrills in the south court," for "architectural details," for "ceilings, &c.," for "mosaic panel, containing the figure of Raphael," for "southern façade of the theatre," and for "pediment in mosaic" of the same. This theatre façade, which is advancing towards completion, will afford an example of the architectural mode of decoration which Sykes, working in co-operation with Captain Fowke, has done much to originate or naturalize in this country. The intaglio and bas-relief ornaments in moulded brick or terra cotta which travellers see as a novelty in Milan, Monza, and Pavia, will shortly find elaborate adaptations in the new museum at Kensington. The art merits, too, of decorative polychromy, which till recent years has been little practised in England, will in this façade be put to the proof. The variety and possible harmony of colour which can be obtained from bricks, tiles, mosaics, and stone, will, at Kensington as well as at Burslem, be submitted to bold trial. It is not desirable to prejudge the merits of those productions upon which there may naturally arise diversity of opinion. It is recorded in the catalogue to these drawings, that when Sykes "had scarcely breath to give his directions, he had himself drawn up by ropes to the scaffoldings, to superintend his pupils and workmen. His last work was the columns moulded in terra cotta for the new buildings. The last directions he gave were for their arrangement in front of the lecture theatre. They were being set up at the time he died." One of these columns, crowned by a composite, or renaissance capital, the shaft composed of six drums, boldly modelled in figure compositions and foliated details, may be seen complete among the terra cotta works in the museum. Sykes, by this exhibition of his works, is proved to have had that wide range of study and diversity of subject common to the immediate followers of Raphael and Michael Angelo. He was sculptor, painter, and architectural decorator. His landscape sketches show the colour which a painter might desire to transfer to structure, and the nature which the decorator learns to conventionalise. This may be a key to the pictorial treatment of architecture towards which Sykes inclined; at least it will be admitted that in the simultaneous culture of sister arts, the resources of the decorator were extended and enriched. Whether the dangers or advantages attendant on such a course be the greater, it is not for us to decide: we may, however, point out that the practise has found precedent in great historic epochs. Art-designers and art-workmen will do well to give to the exhibition thoughtful study. On the death of Godfrey Sykes, in the spring of the present year, the Committee of Council on Education recorded that, "My Lords learn with sorrow of the death of this distinguished officer," who "was selected to fill the post of decorative artist to the museum, which he has held for seven years with credit to himself and benefit to art generally. Their Lordships view his loss as a great one to the museum." It may be added that Mr. Sykes' pupils, Mr. Gamble and Mr. Townroe, have been entrusted with "the joint charge of the studio for preparing the decorative designs of the museum." And "it is their Lordships' wish that each of these artists should form under his direction a class of four pupils, selecting promising young students, who will receive an allowance for their services as soon as they are reported to be valuable."

EXHIBITION OF PICTURES OF THE OLD MASTERS AT AMIENS.—This exhibition, which opened on the 26th of August, is held in the galleries of a fine building called the Musée Napoléon, recently erected by the Antiquarian

Society of Picardy, with Imperial and other aid. The collection consists of 347 pictures, half contributed for exhibition by amateurs of Paris, and the rest by local collectors. The French school is represented by Poussin, Philippe de Champaigne, Claude Lorrain, Largillière, Rigaud, Mignard, Hubert Robert, Watteau, Lancret, Boucher, Baptiste Desportes, Chardin, Nattier, Tocqué, Masse, Greuze, Prud'hon, Danloux, Horace Vernet, and Ary Scheffer; the Italian by Titian, Tintoretto, Palma, Salvator Rosa, Andrea del Sarto, Paolo Veronese, Ribera, Annibal Carracci, Dominichino, Primaticcio, Lucas Giordano, and Guercino; the Spanish by Murillo, Alonzo Cano, Ménesses Osorio, Vélasquez, Paul de Cespédes, and Goya; the Dutch and Flemish by Rubens, Van Dyck, D. Teniers, Jean Steen, Ostade, Albert and Benjamin Cuyp, Jordaens, Govaert Flinck, Karel du Jardin, Lingelbach, Van der Neer, Terburg, Gonzalès Coques, Ferdinand Bol, Ruysdael, Hobbema, Moucheron, Everdingen, Swanevelt, Huysmans de Malines, Van der Helst, Van Utrecht; and the German by Albert Durer, Lucas Kranach, Holbein, and Denner. The collection includes works by several portraitists of high repute, of whose works there are no examples in the Louvre, such as Benjamin Cuyp, Van Utrecht, Van Es, Barent Graat, and David Bailly. There may be a few works of questionable authenticity in the exhibition, but none which do not belong at least to the school of the artist to whom they are attributed, and consequently the gallery presents a very choice appearance, and the collection forms certainly one of the best retrospective exhibitions ever seen in the provinces. The undertaking is under the patronage of the Comte de Nieuwerkerke, the Imperial Superintendent of Fine Arts, and it is said that the contributors, taking into consideration the time lost in consequence of the terrible visitation of which Amiens was lately the victim, have consented to leave their works for exhibition until the end of October. The arrangements are entrusted to the care of M. Borély, a local artist.

EXHIBITION OF FINE ARTS AT LILLE.—The rich and busy town of Lille has not had an exhibition of pictures since 1834, although the inhabitants of that place have the reputation of considerable taste for the arts; it awoke out of this lethargy this year, and its exhibition was on a very large scale, there being no less than 1,575 works on the walls. The period selected was a fortunate one, for, coming soon after the closing of the Paris *Salon*, an immense number of works were placed at the disposal of the committee of management. The catalogue contains the names of a very large number of well-known artists and some few of the *élite*. The Comte de Nieuwerkerke, Imperial Superintendent of Fine Arts, patronised the exhibition, and contributed the model of his own statue of Catinat (executed in stone for the Church of Saint Gratien), which he has since presented to the museum of the town, one of the richest in the French provinces. The sales at this exhibition reached the large amount of a quarter a million of francs (£10,000)—a handsome sum distributed amongst the fortunate artists. It is not likely, after such an amount of success, that Lille will be again thirty years without an exhibition of pictures.

THE LOUVRE.—The specimens of stained glass belonging to the collections of the Louvre have recently been set up in the windows of the apartments known as those of Henri IV.; they consist of a hundred specimens, mostly small, and illustrative of the best period, as well as the decadence, of the French, Flemish, Dutch, and German schools of the fifteenth, sixteenth, and seventeenth centuries. They present a good means of comparative study in this difficult and peculiar branch of Art. A Chinese and Japanese collection, not of large extent, but consisting generally of choice specimens, has recently been opened in a set of three small rooms on the upper floor, adjoining the collection of arms, costumes, and curiosities from the Pacific and other islands, at the end of the Naval Museum. A collection of ancient

tapestry, it is said, is shortly to be arranged, the Louvre possessing many rare and curious specimens.

Commerce.

STATE OF TRADE.—The September report of the Leeds Chamber of Commerce says, with reference to the woollen trade, that about an average amount of business has been done in the warehouses during the past month. There has been a considerable number of buyers in the market, who have bought cautiously; but, on the whole, the business done has been greater than might have been expected, considering the unfavourable weather, and the bad prospect for the harvest. The shipping trade generally has been quiet, especially to the Continent and to the United States. The manufacturers have been fairly employed, and stocks continue to be very moderate. The public sales of wool have gone off with unusual steadiness, and gradually stiffening prices, so that at the close most descriptions are quoted $\frac{3}{4}$ d. to 1d. per pound higher than at the commencement of the series. The foreign buyers have taken 40,000 bales. The home demand is steady and good, but without any speculative spirit. The English wool trade has been very quiet, with prices in favour of the buyer, until the latter end of the month, when a better feeling prevailed. The flax trade appears to have been unusually dull, and only a very small business has been done. Prices are without much change, but are, if anything, in favour of the buyer. The spinners are generally working full time, but the demand is but languid, and prices are not very firm. In the iron, machine, and engineer tool trades the demand for all descriptions of iron has been small, and the prospects for the autumn are not so good as could be desired. The machine makers are tolerably well employed, but the trade has not well recovered from the depression caused by the war on the Continent. The tool makers continue to be tolerably well employed, but few orders for the future are given. The locomotive makers are busy, the custom of entering into large contracts extending over a long time preserving this trade from frequent fluctuations. The cut nail trade is rather better. In the seed crushing and oil trades there has been a good demand for both rape and linseed oils during the month; prices are very firm, and the trade is in a healthy state. The large export of linseed oil to America has very much reduced the stock in Hull. Seeds are firmly held, and prices on the Continent are higher. Cakes are in fair demand for the season. Olive oil is using largely in this district, and prices are very firm; the rates demanded at the shipping ports would leave a loss to the importers. The leather trade has been very quiet in all its branches, and stocks are larger. Shaved and dressing hides have been easiest to quit, but the demand has not been large. Tanners are mostly working short time, and the production is being lessened. There has been an increased demand for paper. Material remains at about the same price. The supply of cattle has been good, and sometimes in excess of the demand. On such occasions the regulations preventing the removal of cattle out of the borough have caused forced sales. Number shown (four markets)—Beasts, 1,445; sheep, 11,400. There has been a fair supply of both new and old wheat; the new wheat generally in bad condition, and difficult to dispose of. Prices have advanced considerably.

THE TRADE IN RAGS.—Foreign rags, for the use of the paper maker, are now imported into Great Britain from almost every country; they come hither even from Japan and the most remote states of South America, but the Continent of Europe is the chief source of supply. The bags containing them are not opened in the docks, and very rarely in the rag merchant's warehouses, but transmitted in the condition in which they have been imported to those who purchase them for the

purposes of their manufactures. Home rags also, for the most part, pass through the hands of the wholesale rag merchants, who are chiefly congregated in London, Liverpool, Manchester, and Bristol; but before reaching them they pass through various other hands, the marine-store dealers and the collectors of household rags sorting them more or less before selling them. The rag merchants, however, have to re-sort some. Generally, there is no process adopted by the trade for cleansing or disinfecting rags up to the moment at which they leave the rag merchant, beyond such as may be involved in the sorting they undergo. Rags collected in country districts are, as a rule, cleaner than those collected in towns. Irish rags are generally very filthy, and many foreign rags (such as Italian, Spanish, Russian, and especially Egyptian) are often not only dirty, but most offensive in smell. In 1863 we imported 25,288 tons of foreign linen and cotton rags; in 1864, 23,732 tons; last year, 18,263 tons; and in the six months ending June this year, 8,842 tons. Such rags as are useless for any other purpose are employed as manure in hop grounds. With this exception, all woollen rags (and 22,000,000 pounds are annually imported) are converted into shoddy; and articles consisting of a mixture of cotton and wool (called "Challies") are now made available by removing the cotton by means of sulphuric acid. The cotton and linen rags go to the paper mills, which also turn to account many other materials, such as old paper, pawnbrokers' tickets, and the minute discs which are punched from postage stamp sheets, not to speak of straw and some 50,000 or 60,000 tons of esparto grass. There are supposed to be in the United Kingdom 370 or 380 paper mills; the quantity of paper made weekly at each varies from one or two to 70 or 80 tons, the amount of rags used being about 5 per cent. in excess of the paper manufactured. The number of hands employed at a mill ranges from four or five to seven hundred. One of the first processes to which the rags are subjected at the mills is that of dusting, by which is removed not only the extraneous dust, but much of the animal filth which has become incorporated with them while in use. In some of the larger mills this is the first process, and is done by beating by machinery. The rags are thus, before being placed in the hands of the rag-cutters, deprived of much of that which is likely to be offensive in them; and the rag-cutting room, which is always a dusty and not agreeable place, is rendered much more cleanly and sweet than it would otherwise be. But in many mills the dusting is not effected until after the rags have been cut and sorted. There is a single mill (Mr. Joynson's) in which from 250 to 350 rag-cutters are employed. On inquiry among the work-people in London, at the rag merchants' warehouses and the marine-store dealers, Dr. J. S. Bristowe, medical officer to the Privy Council, failed to obtain any evidence that infectious diseases have been brought to them through the agency of rags, or that any fever has prevailed among them.

THE AMERICAN TRADE IN INDIAN CORN.—The superabundant production of this cereal in the Western States, and the variety of uses to which it is put, makes it, next to wheat, the most important crop in the economy of production. The rapid settlement of the Western States, from the tide of emigration from the eastern and middle States, and Europe, has unprecedentedly increased this crop; and the production has more than doubled even in the last eight or ten years. The whole crop of the United States in 1840 was 379,000,000 bushels, and in 1860, 830,500,000 bushels. But the North-Western States are the great maize producers, having raised 156,500,000 bushels in 1840, 476,500,000 in 1860, and 704,500,000 in 1865. The production of this cereal has an important effect upon the American revenue and nearly all the great industrial revenues of the country. It enters largely into the manufacture of distilled spirits, pork, beef, starch, syrup, and is all important to the external com-

merce and railway transportation. In the more isolated portions of the West it is used on the cob very extensively for fuel, being more economical than wood or coal in those sections where the latter articles are not plentiful. The foreign demand has attained a very considerable magnitude. Companies have been formed in New York, Montreal, and in several places in the West for the manufacture of sugar and syrup from corn, by a chemical process, discovered by Professor Gesling, a scientific German, of Buffalo. It is said that three gallons of fine quality syrup can be obtained from 36 lbs. of corn, and that the refuse, after obtaining the starch from it, is worth, for cattle food, 10d. This crop under a more widely-spread cultivation, will soon, in America, be 2,000,000,000 of bushels annually, with a domestic consumptive demand approximating to the increased supply. The imports into Great Britain from all countries vary from 6,000,000 to 12,000,000 cwt. annually. This is obtained from the southern ports of Russia, Austria, and Turkey. The American export varies with the crops and the ability to compete with the Mediterranean countries.

PRESERVED MEATS.—A recent report to the Foreign-office, by Mr. F. C. Ford, dated Buenos Ayres, June 26, gave a description of four different processes pursued by various persons for the purpose of preserving the meat available in enormous quantities from the slaughter of cattle in the River Plate for transportation to Europe, and consumption in our markets. During the last two years attention has been specially directed to this subject, and with results which seem at all events to indicate that the problem will ultimately be solved. The first process described by Mr. Ford is the old one for the manufacture of the salted beef known as *charqui*, and which, although its appearance to Europeans is absolutely offensive, is a staple article of food among the negroes of Brazil and Cuba, whither 70,000,000lbs. weight is annually exported. Some experienced persons in the trade are still disposed to believe it might, if shipped with care, come into use as an acceptable food here for the poorer classes, but few who are conversant with English habits will be likely to share that view. At the same time, the extraordinary prospects that would be opened up if methods could be found to present the River Plate meat, after a transit of 6,000 miles across the Atlantic, in a palatable and healthy form, has stimulated persons of scientific reputation to make experiments. Mr. Morgan, Professor of Anatomy in the Dublin College of Surgeons, has introduced a system of forced infiltration of brine into all the tissues of the animal immediately after death,* and this is said to be simple, and to demand little labour and no expensive machinery. Within the past sixteen months about 500,000 lbs. of beef and mutton prepared in that manner have been shipped from Montevideo to Liverpool, and met a ready sale at 4d. per pound; and although that price would be barely remunerative under present circumstances, "it is believed that it will leave a fair profit when once the working is established." The beef is said to bear a strong resemblance to English corn beef. A company at Liverpool, called the Morgan Patent Meat Preserving Company, have bought the patent, and works have been established near Paysandu, on the Uruguay, in the Oriental Republic. The next process described is that of Baron Liebig, and consists in reducing the meat to an essence, at the rate of 1 lb. of essence to 36 lbs. of meat, so that eight small tins will hold the concentrated alimentary matter of an entire ox, and 1 lb. of the essence is sufficient to make broth for 128 men. But this preparation is suitable only for soup or stock, and the cost of 1 lb. is 12s. 6d. The smallness of its bulk, and its purity and entire freedom from grease, particularly adapt it to the use of hospitals and invalids; and in Germany, whither the principal consignments have been hitherto made, the

consumption has been very great. In London, also, there is an increasing demand. The establishment for the manufacture is at a place called Fray-Bentos, also on the Uruguay. The last process mentioned by Mr. Ford is one called Sloper's process. This patent professes to enable meat to be preserved in its fresh and raw state for transportation to England, and to arrive in the exact condition of butchers' meat just killed, and to be sold at 4d. to 5d. per pound. The meat is packed in tins, and preserved by the introduction of "a certain gas, the composition of which is kept a profound secret." In April last a trial of some samples was made at Buenos Ayres, in the presence of the Vice-President of the Argentine Republic and other public functionaries, and the result was declared to be perfectly satisfactory. A consignment of 10,000 or 12,000 pounds of beef was to be despatched in July to England, and some specimens are understood to have just reached London. Meanwhile, another very ingenious invention has also been patented. This is by Dr. Redwood, Professor of Chemistry to the Pharmaceutical Society of London, and consists in the immersion of fresh meat in melted paraffin at a temperature of 240 degs. Fahr. This preparation preserves all the nutritive qualities of the meat, and has likewise the advantage of rendering tin cases or any other expensive mode of packing unnecessary. The paraffin forms a coating which is entirely free from any unpleasant appearance, and which is removed by the immersion of the meat in hot water. One great objection, however, seems likely to prevail. The meat thus preserved, although agreeable to the taste, will not bear fresh cooking. It is fully cooked by the process itself, and can, therefore, it is apprehended, be used only in its existing cold state, in which, for army, navy, or other stores or travelling purposes, it may, probably, prove of much value.

Colonies.

NEW SOUTH WALES.—The prospects of this colony are brighter now than they have been for some time. After three or four years of half-harvest, or none at all, there is now every prospect of a bountiful crop. More land is under tillage than before, and the season is now all that can be desired. There has been an abundance of rain, and from all quarters it is stated that the young crops look healthy. The pastoral prospects are good. The rain came in time to provide grass against the lambing season, and the weather having been warm for the first time after the rain gave the young grass time to grow. There has not, therefore, been the mortality there might have been had winter set in earlier, or with more severity. Feed is now abundant, and there is every prospect of the yearly increase being up to the usual average. The price of wool, too, is very encouraging to the sheep farmers. The total revenue for the quarter ending the 30th June amounted to £476,736 15s. 7d.; the corresponding period of 1865 was £372,383 18s. 9d., showing an increase of £104,352 16s. 10d., which, added to the increase on the preceding three months, makes a total increase of £233,533 15s. 11d. The following are the amounts of revenue under each head for the years ended 30th June, 1865, and 30th June, 1866:—

	1865.		1866.
Customs	£573,433		£756,102
Gold	31,886		29,115
Mint	26,391		21,186
Land	314,361		597,423
Post Office	69,653		77,126
Telegraphs	30,972		32,975
Railways	163,106		167,328
Stamps	4,236		67,334
Sundries	240,971		—
	£1,462,009		£1,992,882

* For a description of this, see Paper by Mr. Morgan, read before the Society in April, 1864.—*Journal*, Vol. XII., p. 348.

EMIGRATION.—According to the official returns for the emigration to Australia and New Zealand during the year 1865 the number of persons were distributed as follows:—

To New South Wales.....	2,623
„ Queensland	12,551
„ Victoria	9,713
„ South Australia	5,145
„ West Australia	174
„ Tasmania	40
„ New Zealand	7,037
Total	37,283

This shows a decrease, as compared with 1864, of 3,659, but an increase over that of 1861 of 13,545. The principal decrease last year was in the emigration to Victoria.

QUEENSLAND.—The colonists of Rockhampton and other northern ports are agitating for separation from Queensland, and the erection of those districts into an independent colony. They are very unanimous and enthusiastic in favour of the project.

SYDNEY HARBOUR.—It appears that the colonial government have placed £24,600 on the estimates for the construction of a new dredge, as the rapid shoaling of Sydney Harbour, caused by the sewage of the city being discharged into it, without any provision being made for intercepting the silt washed down from the streets, and brought down by the sewers, is becoming an alarming impediment. The harbour has been sustaining for years past this accumulation of filth, rendering it at length absolutely necessary to employ a steam dredge to maintain the proper depth of water. Several surveys have recently been made under the Harbour Commission, which show that very large and serious encroachments have been made on the water of the harbour by the silt and other refuse washed from the city. Woolloomooloo Bay, in front of the wharf, has been greatly deepened, a very large quantity of silt having been taken up and deposited to raise the ground behind the wharf. The streets of the reclaimed lands of this bay have been filled in and brought to their proper level.

TASMANIAN REVENUE.—The total revenue for the past half-year of 1866, at Hobart-town was £33,678 11s. 6d., and at the port of Launceston, £30,478 3s. 5d.; total £64,666, showing an increase of £738 as compared with the same period last year. The land revenue for the quarter ended June 30th, 1866, was £26,419 19s. 3d., against £21,947 17s. for the same period of 1865. The total revenue for 1865 was—Customs, £118,775; inland, £43,434; land, £71,343, making a total of £233,552, against £266,602 in 1864, £250,657 in 1863, and £255,780 in 1861.

QUEENSLAND COTTON.—Some experiments in cotton growing have been tried by some settlers on the north bank of the Brisbane. The proprietors planted last season, to test the relative value of the two crops on equal quantities of land of the same description, in maize and in cotton, ten acres on each. Both crops turned out remarkably well. The maize averaged 70 bushels, and realised £17 per acre. The cotton yielded 650 lbs. of cleaned New Orleans, giving a return of £50 per acre. In consequence of this result, 30 acres was planted for cotton in the present season, and the picking is now in progress, with every prospect of a very large crop.

COLONIAL KEROSENE OIL.—On the subject of the Hartley coal oil the *Sydney Morning Herald* says:—“The richest canal coal yet discovered in Australia is being transmuted into oil. Some of the first produce from the works of the Hartley Company has been received in town, and its quality is in every respect satisfactory. The crude oil is produced from the coal by the process of retorting. At present only nine retorts are set up; they are producing at the rate of 1,200 gallons per week, but they are not worked up to their full

capacity, and can be made to produce 2,000 gallons per week. The Hartley oil does not catch fire till it is heated to a temperature of 147 deg. This is important in a country like this, where in the heat of summer the thermometer often ranges above 100 deg. The consumption of kerosene in these colonies must probably amount to two million gallons per annum, and the rate of consumption is steadily on the increase, even leaving out of account any probable demand for steam purposes. There is, therefore, a large local market, irrespective of any trade that may be done by exporting.”

Publications Issued.

JOURNAL DE L'AGRICULTURE. — (*Ch. Delagrèe and Cie, Paris.*)—The attention now directed towards agriculture in France, is indicated by the increase of the number of publications relating to this important science and industry. The work of which the title is given above is under the direction of M. J. A. Barral, the editor of a well-known periodical, *La Presse Scientifique et Industrielle*, who is assisted by a large number of writers of established reputation. The concluding part of the first volume is now ready, making a large octavo volume of nearly five hundred pages. The work is published twice in the month, and the price is exceedingly moderate. It contains a large amount of information relative to the condition of the crops, meteorology, cattle, agricultural implements, new plants, improved methods of cultivation, distillation, wine-making, cheese-making, and other rural industries, and is illustrated by many wood-cuts; with elaborate tables of prices current in the various parts of France as well as in other countries; lists of works relating to agriculture, and much valuable miscellaneous information, including comparative notes relative to the condition of agricultural matters in England and other countries; presenting altogether a valuable compendium for scientific and practical agriculturists. The journal has the support of many of the central and local societies for the encouragement of agriculture, so that it may be said to be, to a certain extent, official as well as critical, while M. Barral's reputation as a populariser of science is a guarantee for the maintenance of the useful character of the new journal.

Notes.

PARIS MARKETS.—The *Marché Beaujon* is situated in the Rue de Lisbonne, near the Rue Miromesnil and the Bouvelards Haussmann and Malesherbes. This market, of large size, and constructed on irreproachable conditions of ventilation and internal arrangements, contains 300 stalls. It replaces the market known first under the name of *Marché Percier*, afterwards *Marché de Laborde*, at present abolished, and which was held twice a week close to the Eglise St. Augustin. The new market, which is held daily, will supply the whole of the population from the Faubourg du Roule to the Rue d'Amsterdam, and will be a boon to these quarters—up to the present time without a central means of supply of provisions—and will now enable them to obtain their household provisions with competition both in price and quality. This new market is the first large market opened to the public by the *Compagnie Générale des Marchés*; they have still ten more to construct or finish. Towards the 15th October they will open the *Marché Brézin*, at Montrouge; the 15th November, that called *St. Quentin*, on the Bouvelard Magenta; about the 15th January the *Marché des Batignolles*, and soon after one on the *Place d'Italie*. Auteuil and the *Porte Dauphine* (Passy) will have their markets completed about May; and in the course of the year 1867 the *Marchés de Montmartre, les Villettes, Belleville, Vaugard, will be*

opened to business. These great works of public utility are connected with the most important and necessary improvements of the capital.

SPANISH RAILWAYS.—The line of railway crossing the passes of Sierra Morena is now open for traffic; thus the journey may be made without interruption between Paris, Madrid, Cordova, Seville, and Cadiz. Within a few months Madrid will be united with Lisbon by the Badajoz railway.

FRENCH PHARMACOPOEIA.—The last issue of the French Pharmacopœia appeared in 1837; a new edition has just been prepared, the result of the labours of an Imperial Commission during the last three years. In addition to the changes rendered necessary by the progress of science, the formulæ have been drawn up as far as possible in accordance with those of neighbouring countries, and an appendix has been added, containing foreign formulæ of recognised value. The new edition is therefore regarded by its authors as the first approach towards that grand desideratum, a universal pharmacopœia. In this age of rapid travelling, says the commission, chemists may be called upon to make up the prescriptions of medical men residing at great distances, and, therefore, local pharmacopœias have had their day; nothing but one recognised by all the scientific world is worthy of the time; but, in order to produce such a work the concurrence of various governments is as necessary as for the generalization of money, weights, and measures. In the meantime France takes the first step on the road, and it is hoped that her endeavours will not be repulsed, and that the world will be endowed with another element of public health and security; it is hoped amongst other things that other nations will not persist in their special doses in the case of medicines containing active and dangerous poisons, such diversity in practice creating unnecessary perils for invalids, a preparation, bearing the same name, being in one place too weak and ineffective, and in another too strong and dangerous. It would undoubtedly be highly advantageous if the formulæ of all pharmacopœias could be made to agree, but there are many serious difficulties in the way, such as climate, constitution, diet, to say nothing of habit; nevertheless, every attempt to generalise medical science deserves, and will doubtless receive from all enlightened men, cordial approval and co-operation.

THE FOUNDATIONS OF THE OLD LOUVRE.—Excavations have recently been made in the court of the old Louvre, with the view to the discovery of the real position of the older Louvre, that of Philippe Auguste, and the search has been crowned with success by the uncovering of the foundation walls of the whole of the five towers of the former building. These ancient works are very solid, and are now in part open to the view of all the world.

AN EXTENSIVE FARM IN BRAZIL.—One of the most extensive farms in the world is that of the General Urquiza, of Buenos Ayres. It is about 300 square leagues in extent, on which there are grazing almost incalculable numbers of horses, beasts, and sheep. This farm sends 50,000 head of cattle annually to be slaughtered. The horses would be sufficient to mount the cavalry of a large army, and a good many ships are annually laden with the wool of the sheep, for Europe.

Patents.

From Commissioners of Patents' Journal, September 28th.

GRANTS OF PROVISIONAL PROTECTION.

Actinic power of light, determining the—2355—L. Bing.
Architectural mouldings, composition for—2320—C. Bathoe.
Beer and ale—2298—J. Schneider.
Bookbinding—2211—L. Delagarde.
Boot legs—2321—C. F. de Gaudel.
Boots and shoes—2310—C. F. Allbon.
Buttons or studs—1945—I. Hayem, jun.

Calcareous bricks—2323—W. E. Gedge.
Carriages—2342—J. Williams.
Cornices—2162—T. W. H. Newbold.
Electric telegraph conductors—2329—J. H. Johnson.
Fabrics—2351—W. Clark.
Fabrics, cross raising the pile of—2297—J. and J. W. Asquith.
Fire-arms, breech-loading, and cartridges—2304—C. E. Brooman.
Fire-arms, breech-loading, &c.—2326—E. Harlow.
Float light—2301—C. Defries.
Furniture—2343—J. P. Bright.
Gun carriages—2328—R. A. E. Scott.
Gun carriages—2338—R. A. E. Scott.
Guns—2337—R. A. E. Scott.
Hoops, uniting the ends of—2345—S. Woodall and J. M. V. Winkle.
Hydraulic gas chandeliers—2357—G. Henderson and D. McNeil.
Indicators—2340—W. E. Gedge.
Ink-supplying penholders—2309—A. F. Chapple.
Irons, handles of—2313—J. Silvester.
Lace—2290—W. Selby.
Leather—2316—W. Clark.
Leather straps—2344—M. J. Haines.
Leather straps, &c.—2336—W. E. Gedge.
Lights in theatres, lighting—2318—W. Vincent and G. R. Westcott.
Liquids, measuring—2333—R. A. Hardcastle.
Liquids, separating matters from—2331—W. Olley.
Marine steam boilers—2339—G. T. Bousfield.
Metallic mirrors—2018—J. W. Hoffman and G. R. Wilson.
Motive power—2330—R. Bennett.
Oil-cup—2312—C. E. Brooman.
Pianofortes—2335—T. C. Lewis.
Rags, &c., cutting—2947—E. H. Aydon and E. Pocock.
Railway break—2302—J. and W. Kitchen, and S. Samuels.
Railways, working switches and signals of—2185—W. L. Owen.
Railway trains, signalling on—2295—A. H. Hart.
Reaping machines—2314—C. T. Burgess.
Roller skates—2305—W. F. B. Klein.
Sanitary purposes, apparatus for—2346—T. Wheelhouse.
Seamless metallic tubes—2319—A. V. Newton.
Ships—2294—T. Berney.
Steam boilers—2332—T. Baldwin.
Steam engines, lubricating—2317—W. Frankland.
Steam engines, slide valves for—2296—C. D. Abel.
Steam vessels, steering—2327—W. J. Curtis.
Steam whistles—2288—W. Cuthbert.
Structures, connecting parts of—2334—F. A. Paget.
Studs, &c.—2322—W. E. Gedge.
Thrashing machines—2948—J. Davey.
Timber, sawing—2300—J. Lochhead.
Type, composing—2303—A. Mackie.
Water-closets—2315—F. Warner, W. Stewart, and G. W. Barber.
Water-power engines—2306—E. T. Hughes.
Weaving, looms for—2292—J. Bullough.
Weaving, looms for—2308—C. Catlow.
Weighing machines and indicators—2311—C. Hodgson & J. W. Stead.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Steam pumps—2469—W. R. Lake.
Steel—2415—A. B. Berard.

PATENTS SEALED.

916. G. Sturrock.	972. G. Rumbelow.
924. W. Pendry.	1130. W. E. Newton.
933. W. B. and E. J. Collis.	1139. M. Spiquel & E. H. Florange.
934. E. P. H. Vaughan.	1140. M. Spiquel & E. H. Florange.
943. M. P. E. Vors.	1148. C. D. Abel.
946. J. M. Bowan & A. Morton.	1290. J. Hartshorn.
947. C. F. Carlier.	1832. W. Clark.
952. J. Robey.	1868. G. Plant.
968. S. M. Martin & S. A. Varley.	

From Commissioners of Patents' Journal, October 2nd.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2380. J. T. and E. Harlow.	2425. E. B. Wilson.
2410. T. Horsley.	2661. J. Marshall.
2477. G. Parry.	2385. F. Preston.
2382. J. H. Johnson.	2401. J. Mackay.

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2218. W. H. Buckland.

Registered Designs.

An Improved Glove—September 5—4809—Bowen and Sons, Chipping Norton, Oxfordshire.
Self-acting Vent Peg—September 11—4810—T. Lewis, Cardiff.
Gas Burner—September 18—4111—A. F. W. ter Meu, Haarlem, Holland.
A Radiating Ash Pan—September 20—4812—W. Marshall, 293, Oxford-street, Manchester.
A Curved Roller Blind—September 20—4813—R. Lindenzweig and W. Jolly, Islington.
Hat and Coat Rail or Portable Wardrobe—September 22—4814—W. Tonks and Sons, Birmingham.